

### **What Is Claimed Is:**

1. A lightweight fuel tank comprising:
  2. an outer spherical shell member;
  3. a second inner spherical shell member positioned inside said outer shell member;
  4. an inner shell member and said outer shell member being positioned to provide an insulating radial gap between them;
  5. said inner shell member having an outer surface and an inner surface, said outer surface being coated with a low emissivity material; and
  6. said outer shell member having an outer surface and an inner surface, said inner surface being coated with a low emissivity material.

1                   3.     The light weight fuel tank as set forth in claim 1  
2 comprising a second heating mechanism on said outer surface of said outer shell  
3 member for controlling icing of said fuel tank during use.

1                   4.     The light weight fuel tank as set forth in claim 1 wherein  
2     said outer shell member is a sandwich construction employing low heat  
3     conducting skin and core materials.

1                   5.       The light weight fuel tank as set forth in claim 1 wherein  
2       said inner shell member is made of an aluminum material and said outer shell  
3       member is made of a sandwich of titanium, Kevlar and Nomex materials.

1                           6.     The light weight fuel tank as set forth in claim 1 wherein  
2     said low emissivity material is a flash of a copper material.

1                   7. The light weight fuel tank as set forth in claim 1 further  
2 comprising a first port member in said outer shell member for evacuation of  
3 said radial gap to a vacuum, and provide access for filling said inner shell  
4 member with hydrogen material.

1                   8. The light weight fuel tank as set forth in claim 1 further  
2 comprising a second port member in said inner shell member for filling said  
3 inner shell member with a hydrogen material, said second port member having a  
4 valve mechanism.

1                   9. The light weight fuel tank as set forth in claim 1 further  
2 comprising a third port member in said inner shell member, said third port  
3 member having a valve mechanism.

1                   10. The light weight fuel tank as set forth in claim 1 wherein  
2 said inner and outer shell members are connected at three locations, namely two  
3 opposing equatorial external support positions and a port member.

1                   11. The light weight fuel tank as set forth in claim 10  
2 wherein said inner and outer shell members of different materials are connected  
3 by a friction welded insert member.